

**High-Speed Multi-Axis Nanopositioning Systems for Next-Generation Metrology and Lithography**

# More Accurate and Reliable Tools Aid the Development of New Nanotechnology Applications



## Technology and Innovation

The explosive growth of nanotechnology, which continues to shrink military and commercial system components to infinitesimal sizes, has led to a pressing need for tools that can function in this extremely challenging environment. nPoint, Inc. was founded on the premise that advanced measurement tools would be essential for the continued development of nanotechnology, and the belief that existing motion-control products did not have the capability to perform reliably and quickly on the nanoscale.

Under this DARPA SBIR, nPoint developed a three-dimensional (3-D) nanopositioning system for a surface metrology tool that has significant advantages over existing products, in terms of improved precision, accuracy, repeatability, speed, and ease of use.

The primary military application of nPoint's technology is in the area of infrared imaging. In one such application, FLIR—a defense contractor—manufactures infrared imaging systems for airborne vehicles for purposes such as reconnaissance, surveillance, and search and rescue. FLIR achieved significant improvement in its image resolution, which can be accomplished by way of small, repeatable motions of the imaging system relative to the detector. Such motions must be provided by a nanomotion system, but such a system must be light, shock-proof, operational over a wide temperature range, and able to withstand enormous force. nPoint



designed such a system with expertise gained directly from its SBIR contract.

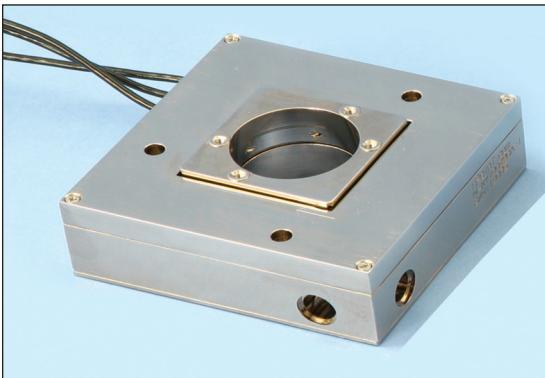
nPoint's end users include both military and commercial customers. The company sells directly to original equipment manufacturers (OEM), which in turn supply the military. Some of the companies that nPoint supplies include VEECO, ZYGO, FLIR, Toshiba, Hysitron, 3M, and Seagate.

For FEI Company, nPoint designed a closed-loop positioning system for semiconductor surface metrology instruments that allows higher speeds and precision, effectively meeting the needs of the next generation of devices as outlined in the International Roadmap for Semiconductors.

nPoint's nanopositioning technology facilitates infrared imaging systems used by airborne vehicles in reconnaissance, surveillance, and search and rescue operations

## Joint Collaborations

nPoint's strategy is to sell to OEMs. This has been effective for the company and, to date, has not required extensive collaborations. As nPoint grows, the



A 3-axis nanopositioner

company is looking forward to many collaborations to support commercialization.

### Lessons Learned

- Understand that transitioning product innovations to the military takes much longer than anticipated. One has to first build confidence in the customer that not only is the product something that is needed, but that the company has enough longevity to service it or supply a new version.
- Get to know program officers at DARPA to understand their needs and interests.
- Get in touch with the local SBIR facilitator, who can help guide the company through the process from identifying a program and creating a proposal to contract award and beyond.
- Improve the chances of award by being ready and able to defend the military or societal need for the product.

### Economic Impact

DARPA SBIRs funded nearly all of the company's product research and development and—because SBIRs don't demand an equity stake in exchange for funding—nPoint's founders and employees have been able to retain more than 60 percent ownership in the company.

The company has leveraged its DARPA SBIRs to solicit and attract angel funding, state government technology loans, and bank loans. nPoint is beginning research and development to enter the biotechnology, pharmaceutical, and advanced optical imaging markets with unique nanopositioning product designs. Future plans are to expand further and explore subsystem or complete system design and manufacture.

### About the Company

nPoint, Inc.—located in Madison, Wisconsin—had its origins in university research. In 2004, nPoint was awarded the MIT Small Technology Company Award.

The company provides enabling technologies in nanopositioning and nanomotion control to some of the world's most advanced laboratories and manufacturers. nPoint nanomotion systems and controllers combine high speed, precision, and accuracy at the sub-nanometer level. nPoint, Inc. serves defense, commercial, and research markets in applications involving imaging, materials and product characterization, nanofabrication, and nanomanipulation. ■

### Company Information

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Marti Smith, President

Founded: 1997

Number of employees: 12